SECTION CO
ENGINE COOLING SYSTEM

CONTENTS

APPLICATION NOTICE

PFP:00000

How to Check Vehicle Type

ABS00CGI

Check the transmission and vehicle serial number to confirm the service information in EC section.

Transmission	Vehicle serial number	Service information
A/T	Up to serial 329287 except 327918, 327920, 327976, 327978, 328979, 329004, 329025, 329078	TYPE 1
	For serial 327918, 327920, 327976, 327978, 328979, 329004, 329025, 329078 and from serial 329288	TYPE 2
M/T	–	

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

ABS004SO

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precautions for Liquid Gasket

ABS000NM

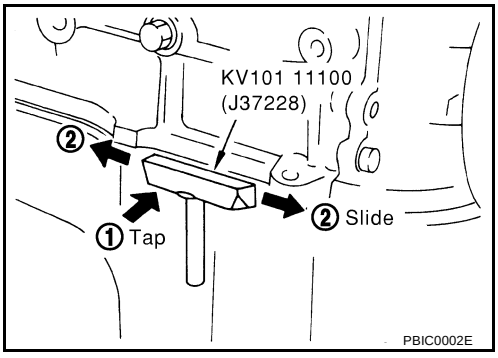
REMOVAL OF LIQUID GASKET SEALING

- After removing the mounting bolts and nuts, separate the mating surface using seal cutter (special service tool) and remove the old liquid gasket sealing.

  CAUTION:
  Be careful not to damage the mating surfaces.

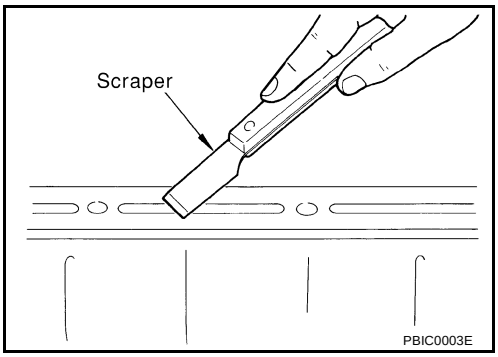
- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap the areas where the liquid gasket is applied.

  CAUTION:
  If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.

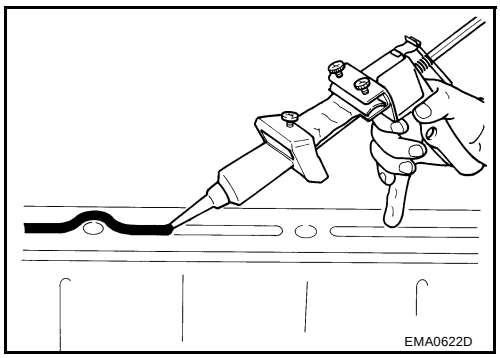


LIQUID GASKET APPLICATION PROCEDURE

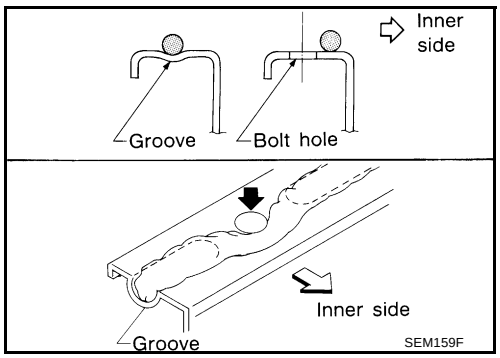
1. Using a scraper, remove the old liquid gasket adhering to the liquid gasket application surface and the mating surface.
   - Remove the liquid gasket completely from the groove of the liquid gasket application surface, mounting bolts, and bolt holes.
2. Wipe the liquid gasket application surface and the mating surface removing any adhering moisture, grease and foreign material.



3. Attach the liquid gasket tube to the tube presser [special service tool: WS39930000 (—)].
Use Genuine RTV Silicone Sealant or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .



4. Apply the liquid gasket without breaks to the specified location with the specified dimensions.
- If there is a groove for the liquid gasket application, apply the liquid gasket to the groove.
- As for the bolt holes, normally apply the liquid gasket inside the holes. Occasionally, it should be applied outside the holes. Make sure to read the text of this manual.
- Within five minutes of liquid gasket application, install the mating component.
- If the liquid gasket protrudes, wipe it off immediately.
- Do not retighten after the installation.
- After 30 minutes or more have passed from the installation, fill the engine oil and engine coolant.



CAUTION:
If there are specific instructions in this manual, observe them.

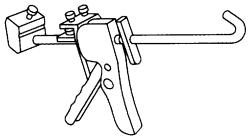
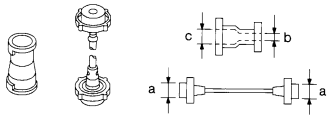
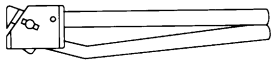
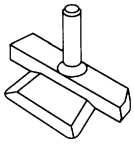
PREPARATION

PFP:00002

Special Service Tools

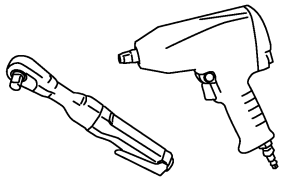
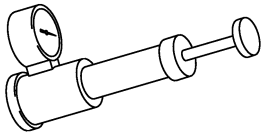
ABS0001F

The actual shapes of Kent-Moore tools may from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
WS39930000 (–) Tube pressure	 S-NT052	Pressing the tube of liquid gasket
EG17650301 (J33984-A) Radiator cap tester adapter	 S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV99103510 (–) Radiator plate pliers A	 S-NT224	Installing radiator upper and lower tanks
KV99103520 (–) Radiator plate pliers B	 S-NT225	Removing radiator upper and lower tanks
KV10111100 (J37228) Seal cutter	 NT046	Removing chain tensioner cover and water pump cover

Commercial Service Tools

ABS0001G

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts
Radiator cap tester  PBIC1982E	Checking radiator and radiator cap

OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

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	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat stuck closed	—	
		Damaged fins	Dust contamination or paper clogging	
			Physical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	Fan assembly	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper engine coolant mixture ratio	—	—	—
	Poor engine coolant quality	—	Engine coolant viscosity	—
	Insufficient engine coolant	Engine coolant leaks	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
			Radiator cap	Loose
				Poor sealing
			Radiator	O-ring for damage, deterioration or improper fitting
				Cracked radiator tank
				Cracked radiator core
			Reservoir tank	Cracked reservoir tank
		Overflowing reservoir tank	Exhaust gas leaks into cooling system	Cylinder head deterioration
				Cylinder head gasket deterioration

OVERHEATING CAUSE ANALYSIS

	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			Improper ignition timing	
	Blocked or restricted air flow	Blocked bumper	—	—
		Blocked radiator grille	Installed car brassiere	
			Mud contamination or paper clogging	
		Blocked radiator	—	
		Blocked condenser	Blocked air flow	
		Installed large fog lamp		

COOLING SYSTEM

PFP:21020

Cooling Circuit

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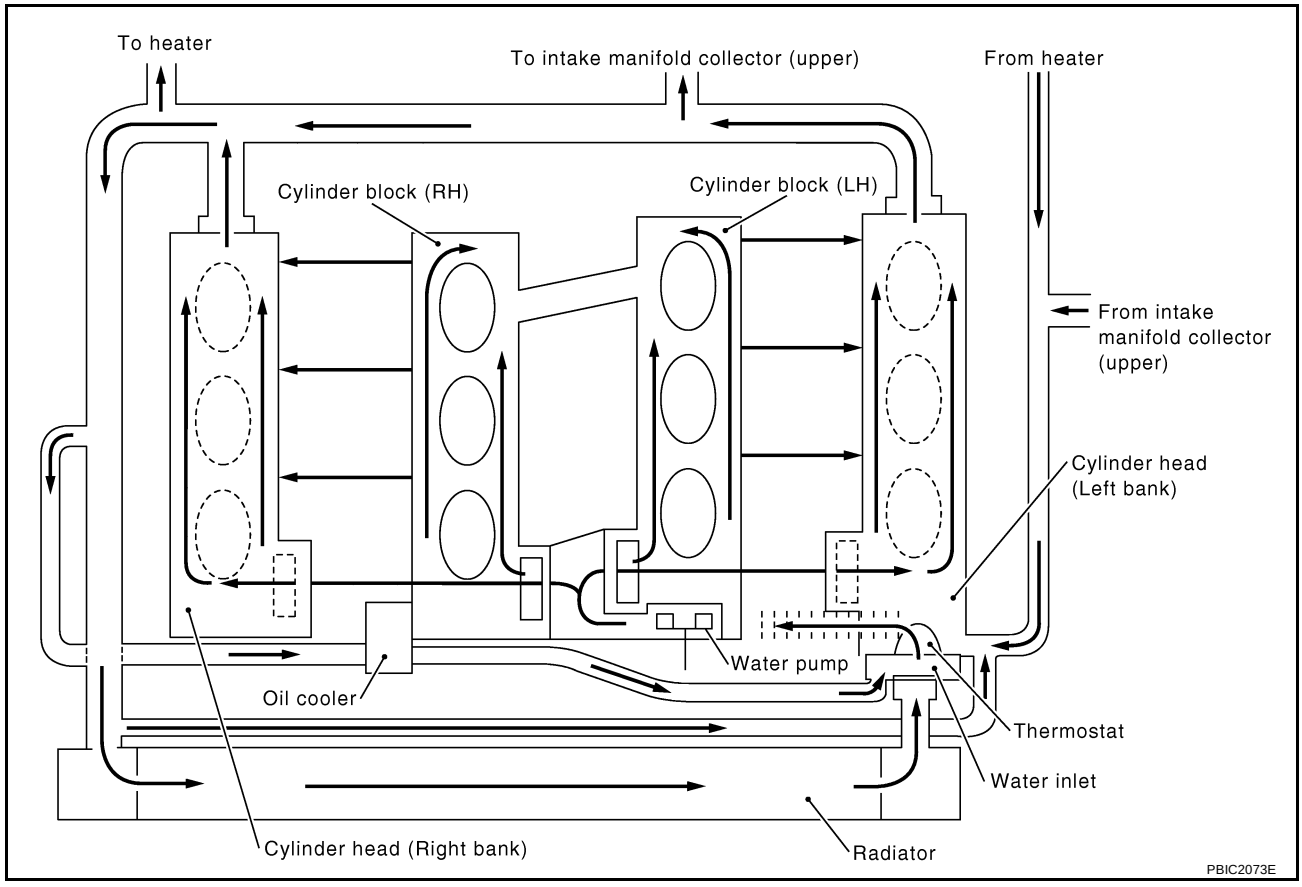

System Chart

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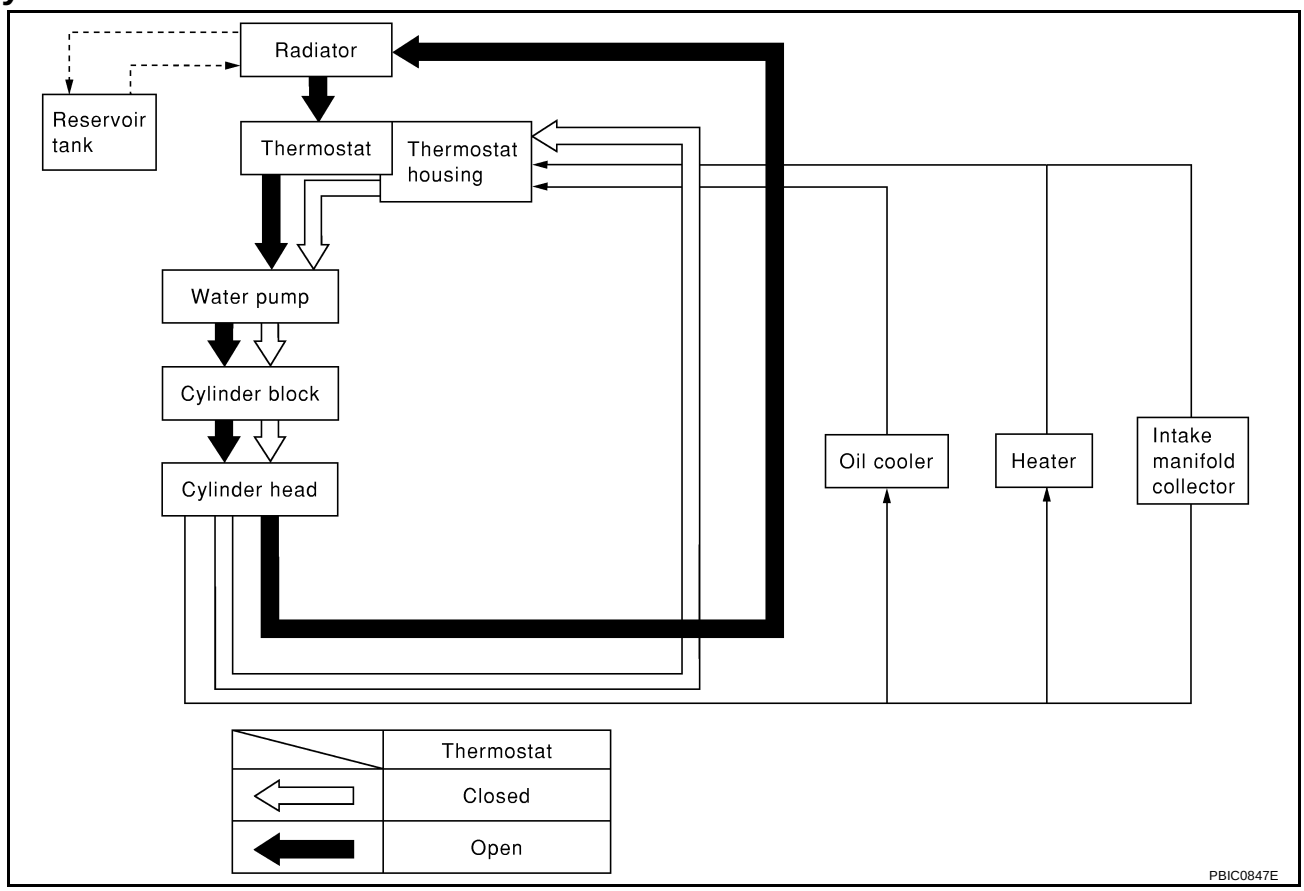

ENGINE COOLANT

PFP:KQ100

Inspection

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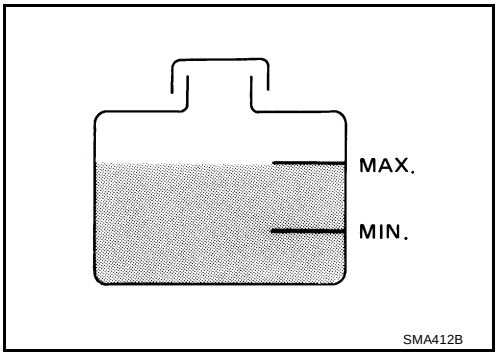
LEVEL CHECK

- Check if the reservoir tank engine coolant level is within the MIN to MAX when the engine is cool.
- Adjust the engine coolant level as necessary.



LEAK CHECK

- To check for leaks, apply pressure to the cooling system with radiator cap tester (commercial service tool) and radiator cap tester adapter [SST].

  Testing pressure

  : 157 kPa (1.6 kg/cm^2 , 23 psi)

  WARNING:

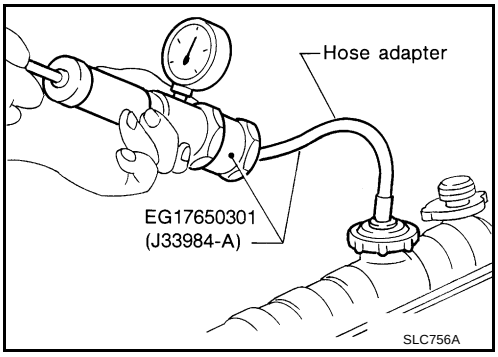
  Do not remove radiator cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from radiator.

  CAUTION:

  Higher test pressure than specified may cause radiator damage.

  NOTE:

  In a case engine coolant decreases, replenish radiator with engine coolant.



- If anything is found, repair or replace damaged parts.

Changing Engine Coolant

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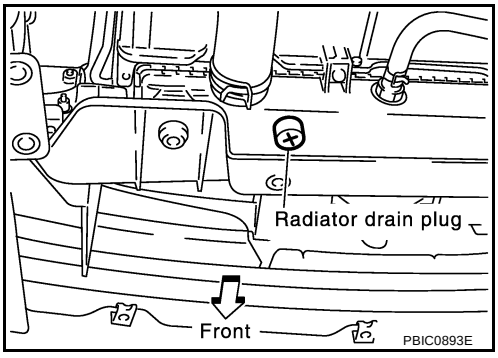
WARNING:

- **To avoid being scalded, never change the engine coolant when the engine is hot.**
- **Wrap a thick cloth around cap and carefully remove the cap. First, turn the cap a quarter of a turn to release built-up pressure. Then turn the cap all the way.**
- **Be careful not to allow engine coolant to contact drive belts.**

DRAINING ENGINE COOLANT

1. Remove undercover with power tool.
2. Open radiator drain plug at the bottom of radiator, and then remove radiator cap.



   When drain all of engine coolant in the system, open water drain plugs on engine cylinder block. Refer to EM-106, "DISASSEMBLY" .

3. Remove reservoir tank as necessary, and drain engine coolant and clean reservoir tank before installing.

4. Check drained engine coolant for contaminants such as rust, corrosion or discoloration.
   If contaminated, flush the engine cooling system. Refer to CO-13, "FLUSHING COOLING SYSTEM" .

REFILLING ENGINE COOLANT

1. Install reservoir tank, and radiator drain plug.

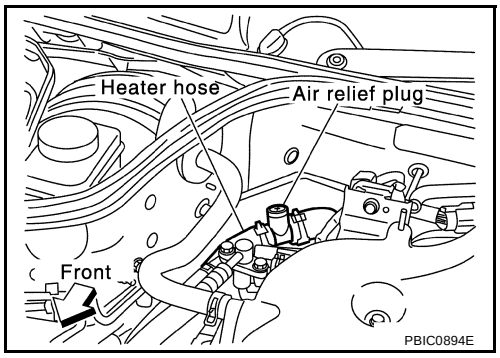
   CAUTION:
   Be sure to clean drain plug and install with new O-ring.

   Radiator drain plug:

   : 0.78 - 1.6 N·m (0.08 - 0.16 kg-m, 7 - 14 in-lb)

   If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-111, "ASSEMBLY" .

2. Make sure that each hose clamp has been firmly tightened.
3. Remove air relief plug on heater hose.



4. Fill radiator and reservoir tank to specified level.
   - **Pour engine coolant through engine coolant filler neck slowly of less than 2 ℓ (2-1/8 US qt, 1-3/4 lmp qt) a minute to allow air in system to escape.**
   - **Use Genuine Nissan Long Life Antifreeze/Coolant or equivalent mixed with water (distilled or demineralized). Refer to MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS" .**

     Engine coolant capacity (Approximate)
     (with reservoir tank at MAX level)

     : 8.5 ℓ (9 US qt, 7-1/2 lmp qt) for A/T models

     : 8.7 ℓ (9-1/4 US qt, 7-5/8 lmp qt) for M/T models

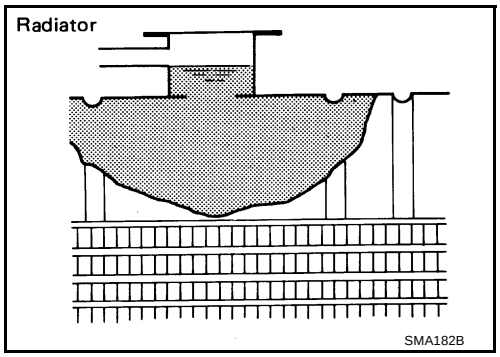
     Reservoir tank engine coolant capacity (at MAX level)

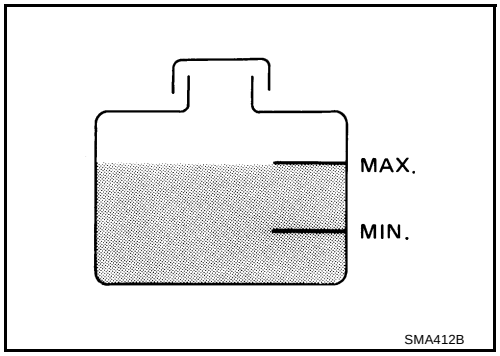
     : 0.8 ℓ (7/8 US qt, 3/4 lmp qt)

   - When engine coolant overflows air relief hole on heater hose, install air relief plug with new O-ring.

     Air relief plug:

     : 0.78 - 1.6 N·m (0.08 - 0.16 kg-m, 7 - 14 in-lb)





5. Install radiator cap.
6. Warm up until opening thermostat. Standard for warming-up time is approximately 10 minutes at 3,000 rpm.
   - Make sure thermostat opening condition by touching radiator hose (lower) to see a flow of warm water.

   CAUTION:
   Watch water temperature gauge so as not to overheat engine.
7. Stop engine and cool down to less than approximately 50°C (122°F).

- Cool down using fan to reduce the time.
- If necessary, refill radiator up to filler neck with engine coolant.

8. Refill reservoir tank to “MAX” level line with engine coolant.
9. Repeat steps 4 through 7 two or more times with radiator cap installed until engine coolant level no longer drops.
10. Check cooling system for leaks with engine running.
11. Warm up engine, and check for sound of engine coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between “COOL” and “WARM”.
    - Sound may be noticeable at heater unit.
12. Repeat step 10 three times.
13. If sound is heard, bleed air from cooling system by repeating step 4 through 7 until engine coolant level no longer drops.
    - **Clean excess engine coolant from engine.**

FLUSHING COOLING SYSTEM

1. Install reservoir tank, and radiator drain plug.

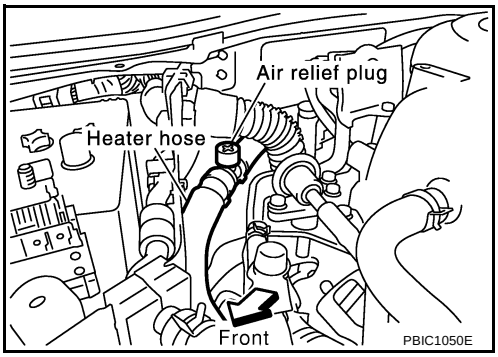
   CAUTION:
   Be sure to clean drain plug and install with new O-ring.

   Radiator drain plug:

   : 0.78 - 1.6 N·m (0.08 - 0.16 kg-m, 7 - 14 in-lb)

   If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-111, "ASSEMBLY" .

2. Remove air relief plug on heater hose.



3. Fill radiator with water until water spills from the air relief hole, then close air relief plug. Fill radiator and reservoir tank with water and reinstall radiator cap.

   Air relief plug:

   : 0.78 - 1.6 N·m (0.08 - 0.16 kg-m, 7 - 14 in-lb)

4. Run engine and warm it up to normal operating temperature.
5. Rev engine two or three times under no-load.
6. Stop engine and wait until it cools down.
7. Drain water from the system. Refer to CO-11, "DRAINING ENGINE COOLANT" .
8. Repeat steps 1 through 7 until clear water begins to drain from radiator.

RADIATOR

PFP:21400

Removal and Installation

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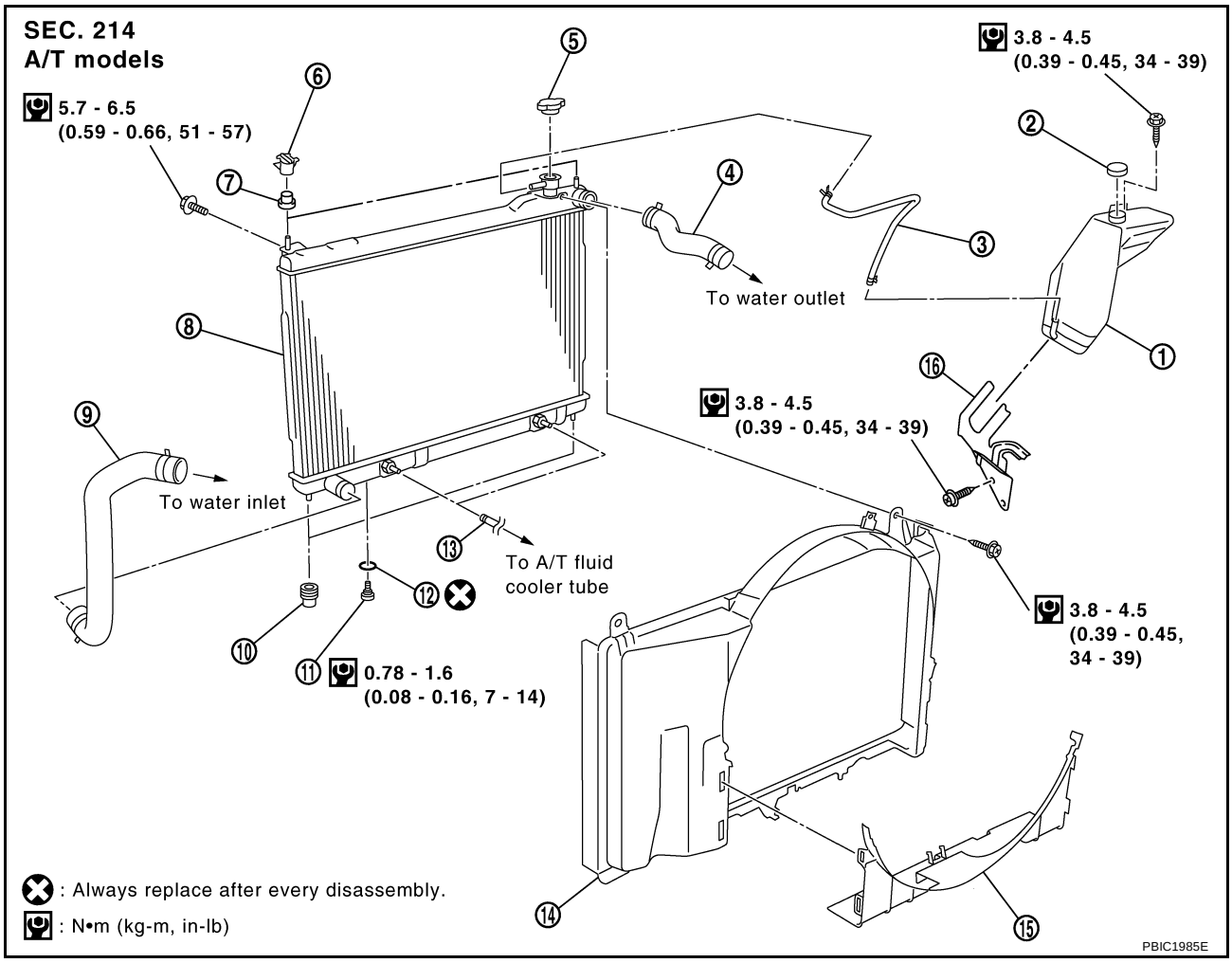
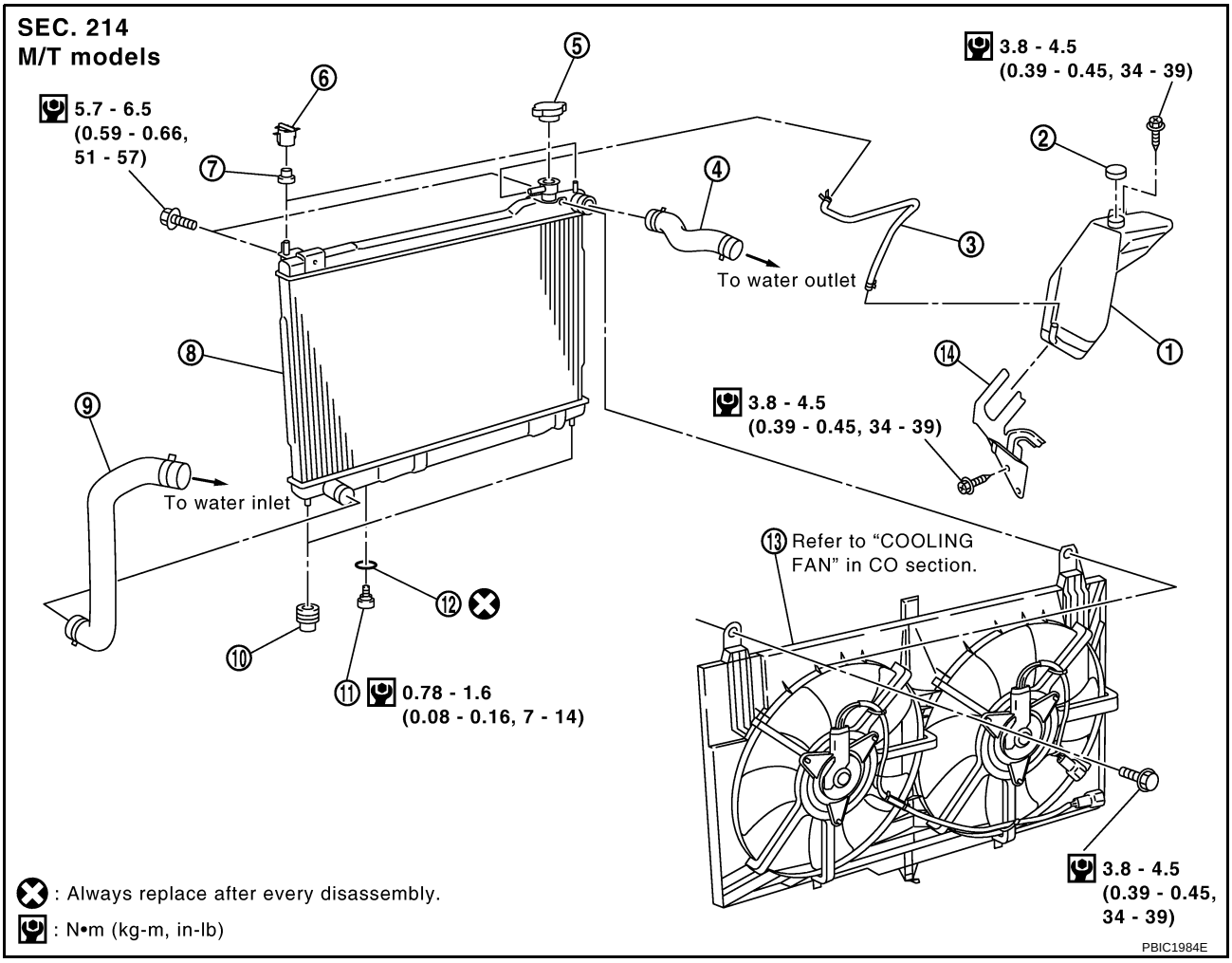


1. Reservoir tank
2. Cap
3. Reservoir tank hose
4. Radiator hose (upper)
5. Radiator cap
6. Upper mount bracket
7. Mounting rubber (upper)
8. Radiator
9. Radiator hose (lower)
10. Mounting rubber (lower)
11. Drain plug
12. O-ring
13. A/T fluid cooler hose
14. Radiator shroud
15. Radiator shroud (lower)
16. Bracket



1. Reservoir tank	2. Cap	3. Reservoir tank hose
4. Radiator hose (upper)	5. Radiator cap	6. Upper mount bracket
7. Mounting rubber (upper)	8. Radiator	9. Radiator hose (lower)
10. Mounting rubber (lower)	11. Drain plug	12. O-ring
13. Radiator cooling fan assembly	14. Bracket	

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator.

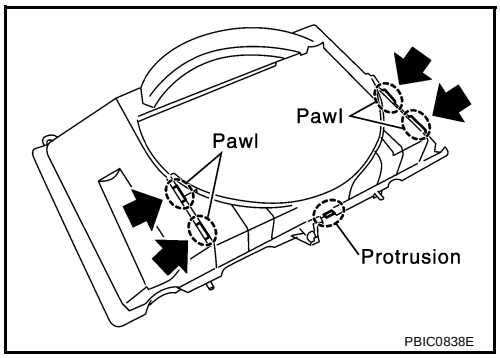
REMOVAL

1. Remove engine cover with power tool. Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .
2. Remove undercover with power tool.
3. Drain engine coolant from radiator. Refer to CO-11, "Changing Engine Coolant" .

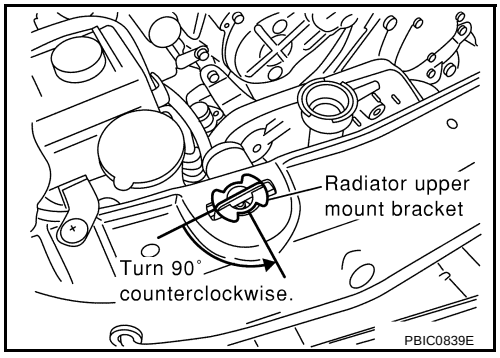
   CAUTION:
   Perform when the engine is cold.
4. Disconnect A/T fluid cooler hoses. (A/T models)
   - Install blind plug to avoid leakage of A/T fluid.
5. Remove air duct (inlet) and air cleaner case. Refer to EM-16, "AIR CLEANER AND AIR DUCT" .
6. Remove bracket mounting bolt for anchoring A/C piping from vehicle left side, so that A/C piping can be moved.
7. Remove reservoir tank and bracket.
8. Remove radiator hoses (upper and lower) and reservoir tank hose.

   CAUTION:
   Be careful not to allow engine coolant to contact drive belts.

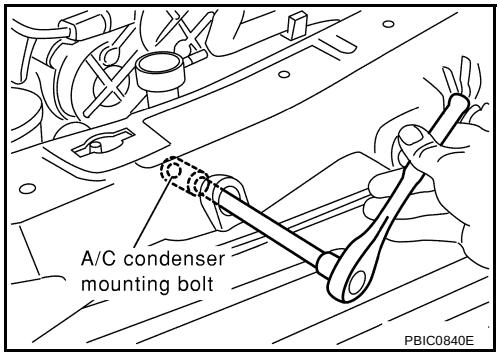
9. Remove radiator cooling fan assembly. Refer to CO-24, "Removal and Installation (Motor Driven) (M/T Models)" . (M/T models)
10. Remove radiator shroud (lower). (A/T models)
    - While pressing left and right pawls in direction indicated by arrows, pull lower radiator shroud toward you to remove.



11. Remove radiator shroud. (A/T models)
12. Remove cooling fan. Refer to CO-22, "Removal and Installation (Crankshaft Driven Type) (A/T Models)" . (A/T models)
13. Rotate two radiator upper mount brackets 90 degrees in the direction as shown in the figure, and remove them.



14. Remove two A/C condenser mounting bolts located in upper part of radiator.

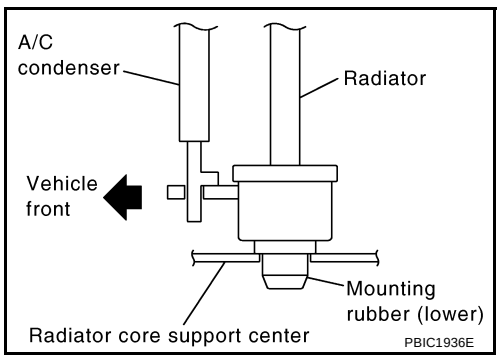


15. Remove radiator as follows:

CAUTION:
Do not damage or scratch A/C condenser and radiator core when removing.

a. With lifting and pulling radiator in a rear direction, disassemble lower mount from radiator core support center.

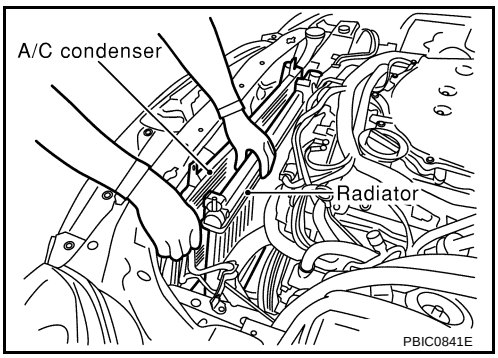
CAUTION:
Because A/C condenser is onto the front-lower portion of radiator, moving to rear direction should be at minimum.



b. Lift A/C condenser up and remove radiator after disengaging the fitting as front-bottom surface.

CAUTION:
Lifting A/C condenser should be minimum to prevent a load to A/C piping.

c. After removing radiator, put A/C condenser on radiator core support center to prevent a load to A/C piping, and temporarily fix it with a rope or similar means.



INSTALLATION

- Install in the reverse order of removal.

Checking Radiator Cap

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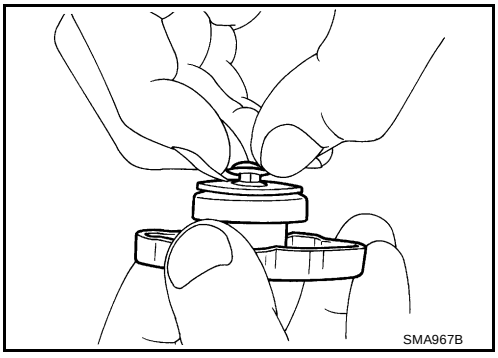
1. Pull the negative-pressure valve to open it and check that it closes completely when released.
   - Check that there is no dirt or damage on the valve seat of the radiator cap negative-pressure valve.
   - Check that there are no unusualness in the opening and closing conditions of the negative-pressure valve.



2. Check radiator cap relief pressure.

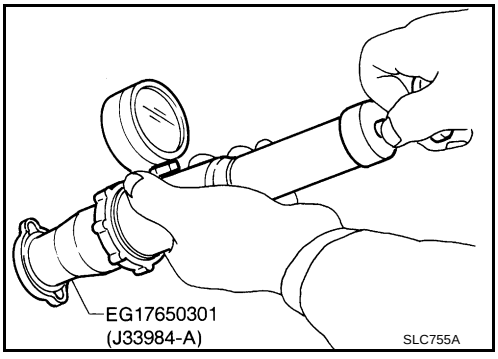
   Standard:

   78 - 98 kPa (0.8 - 1.0 kg/cm^2 , 11 - 14 psi)

   Limit:

   59 kPa (0.6 kg/cm^2 , 9 psi)

   - When connecting the radiator cap to the tester, apply engine coolant to the cap seal surface.
   - Replace the radiator cap if there is an unusualness in the negative-pressure valve, or if the open-valve pressure falls below the limit.



Checking Radiator

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Check radiator for mud or clogging. If necessary, clean radiator as follows.

- Be careful not to bend or damage the radiator fins.
- When radiator is cleaned without removal, remove all surrounding parts such as cooling fan, radiator shroud and horns. Then tape the harness and electrical connectors to prevent water from entering.

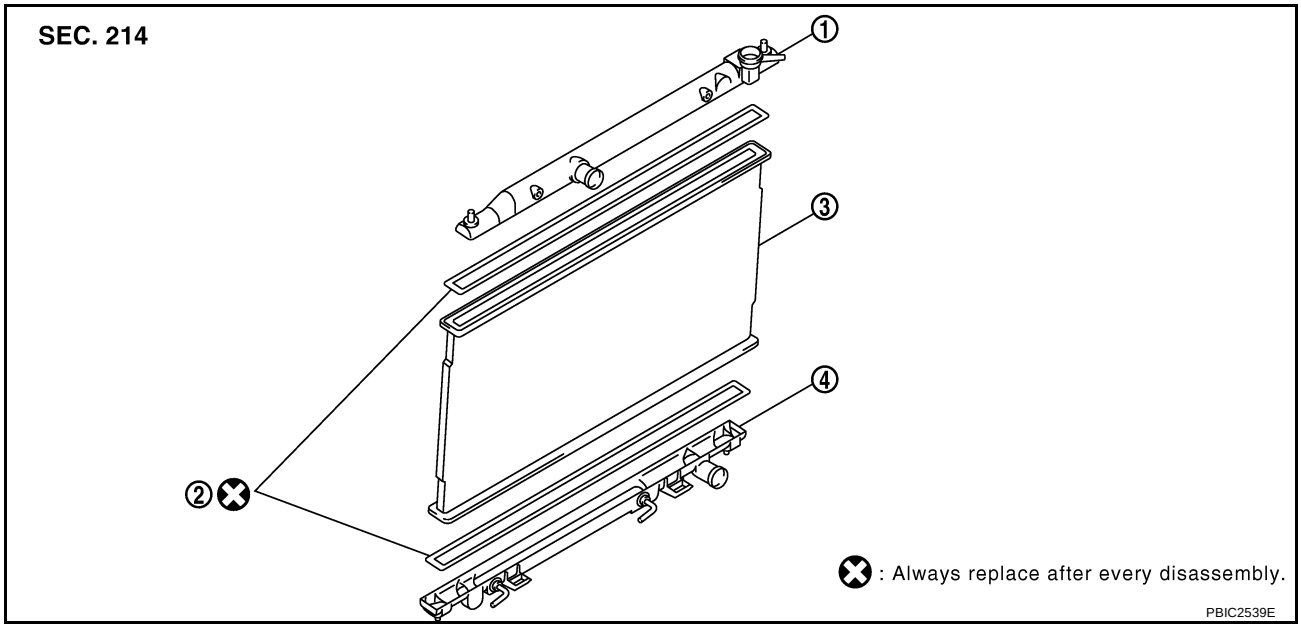
1. Apply water by hose to the back side of the radiator core vertically downward.
2. Apply water again to all radiator core surface once per minute.
3. Stop washing if any stains no longer flow out from the radiator.
4. Blow air into the back side of radiator core vertically downward.
   - Use compressed air lower than 490 kPa (5 kg/cm^2 , 71 psi) and keep distance more than 30 cm (11.8 in).
5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

RADIATOR (ALUMINUM TYPE)

PFP:21460

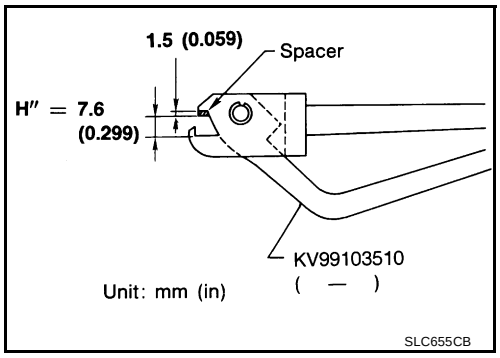
Disassembly and Assembly

ABS0002L



PREPARATION

1. Attach spacer to tip of radiator plate pliers A (special service tool).
   Spacer specification: 18 mm (0.71 in) wide × 8.5 mm (0.335 in) long × 1.5 mm (0.059 in) thick.



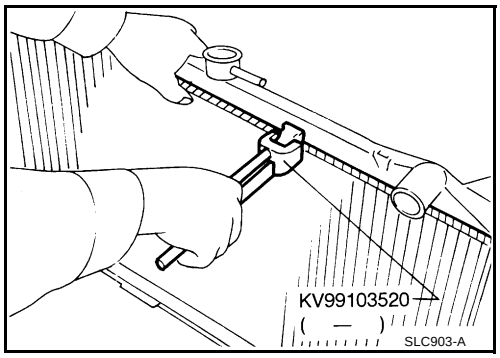
2. Make sure that when radiator plate pliers A [special service tool: KV99103510 (—)] are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with spacer, if necessary.

DISASSEMBLY

1. Remove upper and lower tanks with radiator plate pliers B (special service tool).

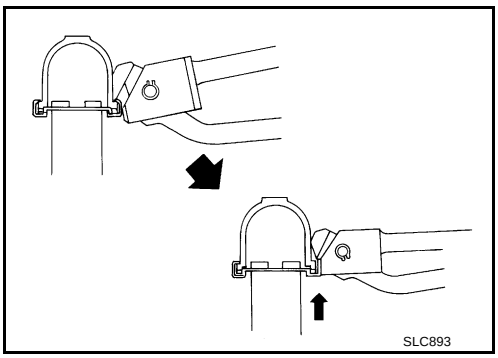
   CAUTION:
   Do not disassemble lower tank and A/T fluid cooler.

   NOTE:
   Regard lower tank and A/T fluid cooler as an assembly.



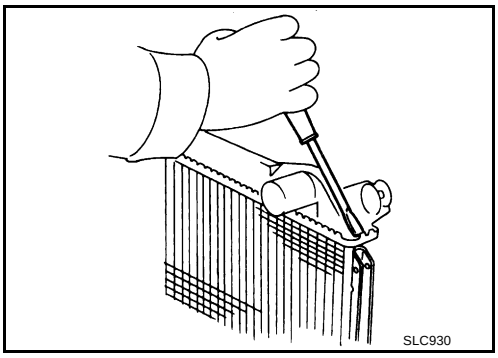
- Grip the crimped edge and bend it upwards so that radiator plate pliers B slips off.

CAUTION:
Do not bend excessively.

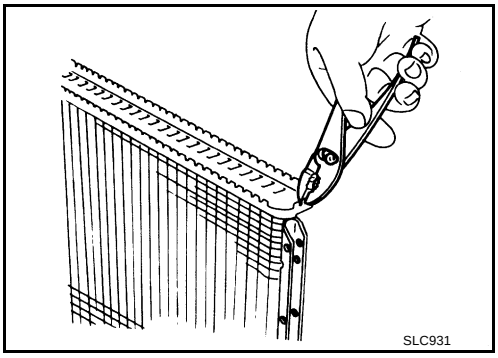


- In areas where radiator plate pliers B cannot be used, use flat-blade screwdriver to bend the edge up.

CAUTION:
Be careful not to damage tank.

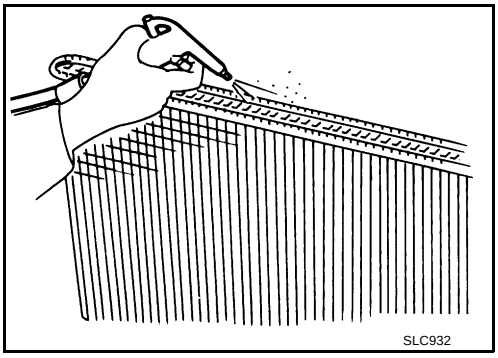


2. Remove sealing rubber.
3. Make sure the edge stands straight up.



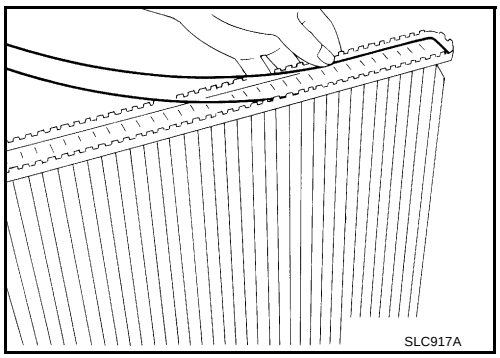
ASSEMBLY

1. Clean contact portion of tank.

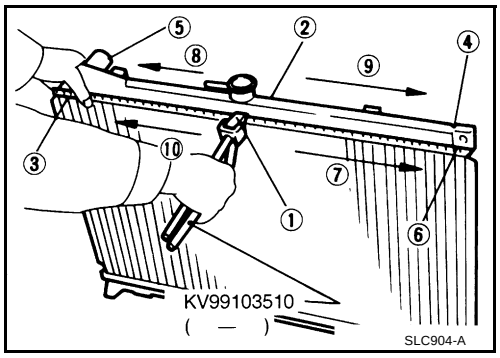


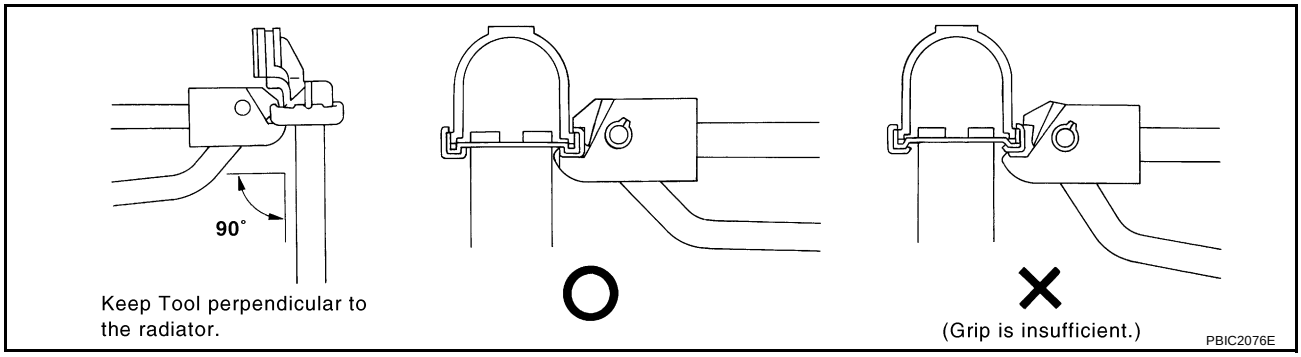
2. Install sealing rubber while pushing it with fingers.

CAUTION:
Be careful not to twist sealing rubber.

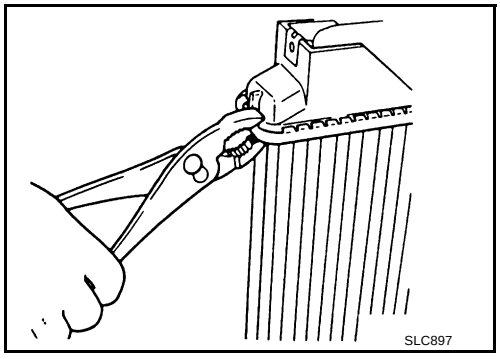


3. Caulk tank in numerical order as shown in the figure with radiator plate pliers A (special service tool).



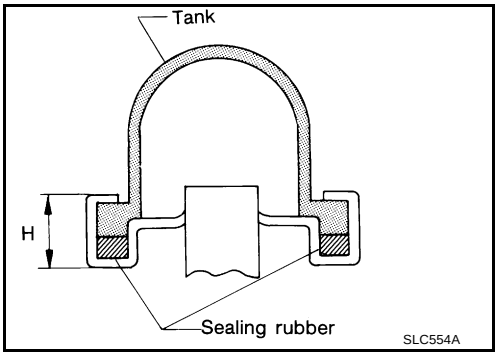


- Use pliers in the locations where radiator plate pliers A cannot be used.



4. Make sure that the rim is completely crimped down.

Standard height "H" : 8.0 - 8.4 mm (0.315 - 0.331 in)



5. Make sure that there is no leakage.
Refer to CO-21, "INSPECTION" .

INSPECTION

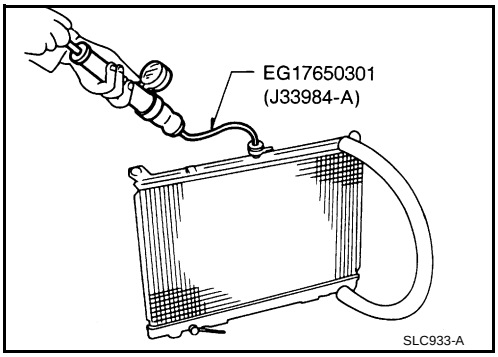
1. Apply pressure with radiator cap tester adapter (special service tool) and radiator cap tester (commercial service tool).

Testing pressure

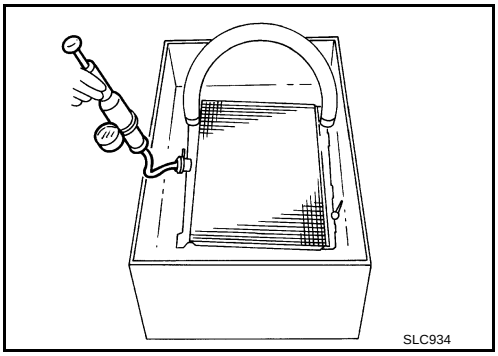
: 157 kPa (1.6 kg/cm^2 , 23 psi)

WARNING:
To prevent the risk of hose coming undone while under pressure, securely fasten it down with hose clamp.

CAUTION:
Attach hose to A/T fluid cooler to seal its inlet and outlet. (A/T models)



2. Check for leakage by soaking radiator in water container with the testing pressure applied.

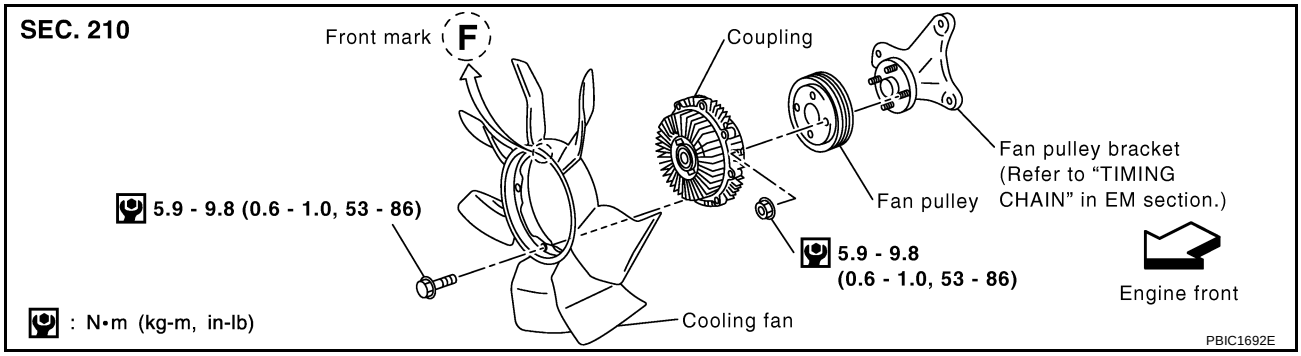


COOLING FAN

PFP:21140

Removal and Installation (Crankshaft Driven Type) (A/T Models)

ABS000JP

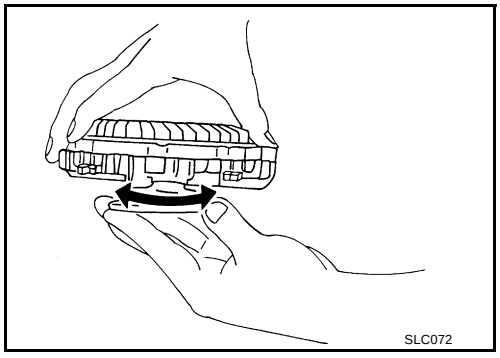


REMOVAL

1. Remove air duct. Refer to EM-16, "Removal and Installation" .
2. Remove the undercover using power tool.
3. Remove the radiator shroud (lower). Refer to CO-14, "Removal and Installation" .
4. Remove drive belts. Refer to EM-15, "Removal and Installation" .
5. Remove cooling fan.

INSPECTION AFTER REMOVAL

Inspect fan coupling for oil leakage and bimetal conditions.



INSTALLATION

Install in the reverse order of removal referring the following.

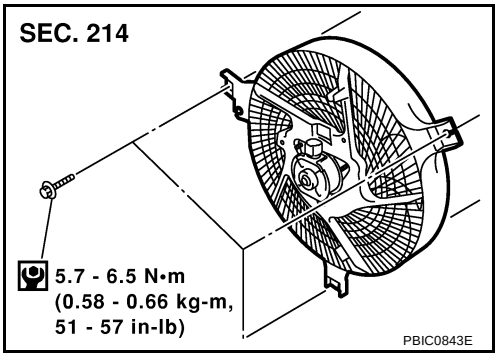
- Install cooling fan with its front mark “F” facing front of engine. Refer to “Component Parts Illustration” CO-22, "Removal and Installation (Crankshaft Driven Type) (A/T Models)" .

Removal and Installation (Motor Driven Type) (A/T Models)

ABS000JO

REMOVAL

1. Remove front grille.Refer to EI-20, "FRONT GRILLE" .
2. Remove the under cover using power tool.
3. Disconnect harness connector from fan motor.
4. Remove fan grille.

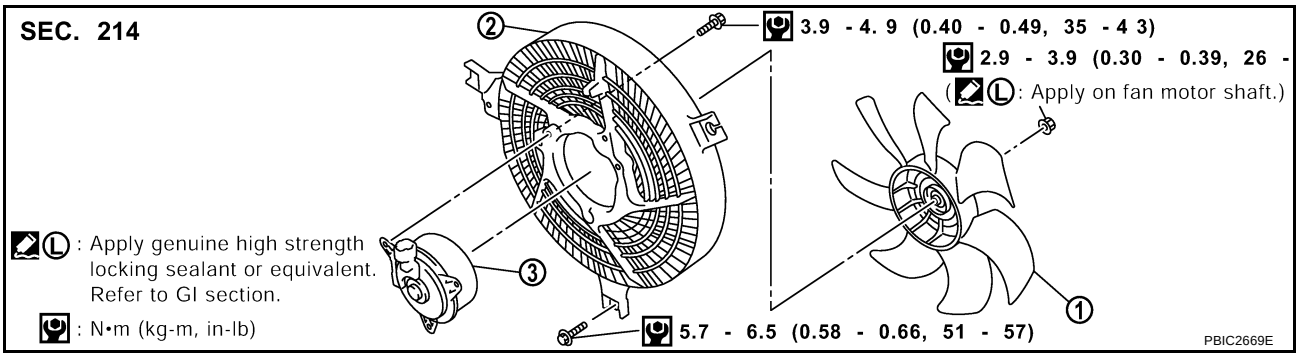


INSTALLATION

Install in the reverse order of removal.

- Cooling fan is controlled by ECM. For details, refer to EC-509, "DTC P1217 ENGINE OVER TEMPERATURE" (TYPE 1) or EC-1123, "DTC P1217 ENGINE OVER TEMPERATURE (FOR A/T MODELS)" (TYPE 2).

DISASSEMBLY AND ASSEMBLY



1. Cooling fan
2. Fan grille
3. Fan motor

Disassembly

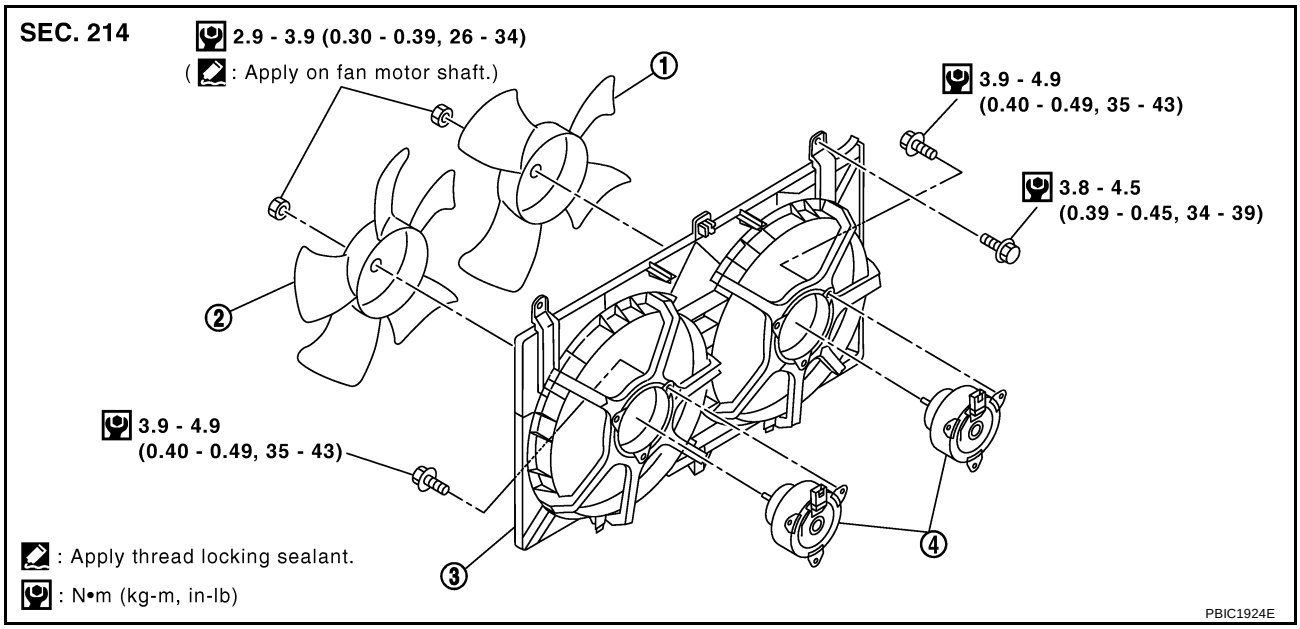
1. Remove cooling fan from fan motor.
2. Remove fan motor from fan grille.

Assembly

Assemble in the reverse order of disassembly.

Removal and Installation (Motor Driven) (M/T Models)

ABS008GO

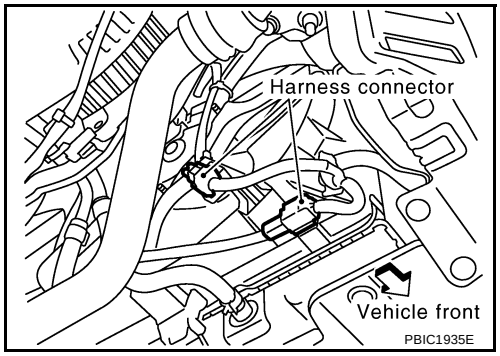


1. Cooling fan (RH)
2. Cooling fan (LH)
3. Fan shroud
4. Fan motor

REMOVAL

1. Drain engine coolant from the radiator. Refer to CO-11, "Changing Engine Coolant" .

   CAUTION:
   - **Perform when the engine is cold.**
   - **Do not spill engine coolant on drive belts.**
2. Remove air duct (inlet), power duct and air cleaner case assembly. Refer to EM-16, "AIR CLEANER AND AIR DUCT" .
3. Disconnect radiator upper hose.
4. Disconnect fan motor harness connectors at the right-lower portion of fan shroud.



5. Remove radiator cooling fan assembly.

   CAUTION:
   Be careful not to damage or scratch on radiator core.

INSTALLATION

Install in the reverse order of removal.

- Cooling fan is controlled by ECM. For details, refer to EC-1135, "DTC P1217 ENGINE OVER TEMPERATURE (FOR M/T MODELS)" .

DISASSEMBLY AND ASSEMBLY

Disassembly

1. Remove cooling fans from fan motors.
2. Remove fan motors from fan shroud.

Assembly

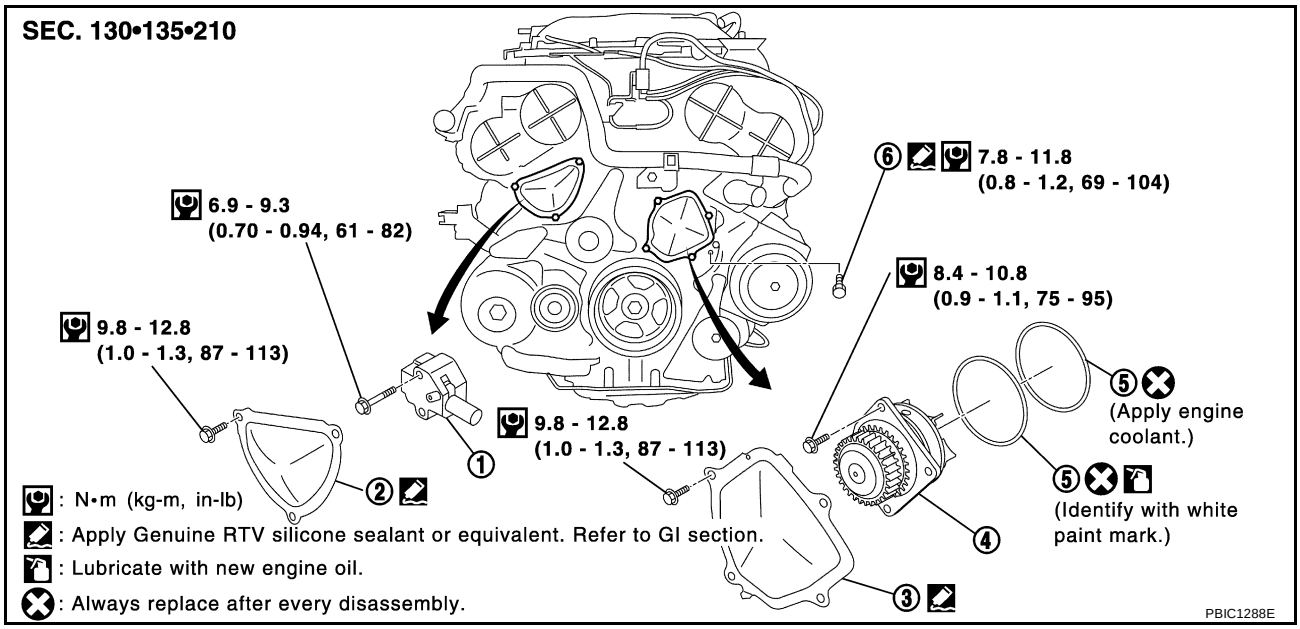
Assemble in the reverse order of disassembly.

WATER PUMP

PFP:21020

Removal and Installation

ABS0001O



1. Chain tensioner
2. Chain tensioner cover
3. Water pump cover
4. Water pump
5. O - rings
6. Water drain plug (front)

CAUTION:

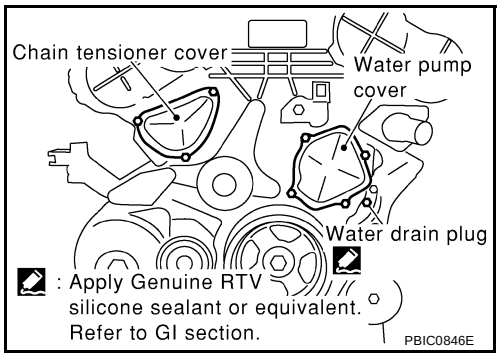
- **When removing water pump assembly, be careful not to get engine coolant on drive belt.**
- **Water pump cannot be disassembled and should be replaced as a unit.**
- **After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester.**

REMOVAL

1. Remove undercover using power tools.
2. Remove drive belts. Refer to EM-15, "Removal and Installation" .
3. Drain engine coolant from radiator. Refer to CO-11, "Changing Engine Coolant" .

   CAUTION:
   Perform when the engine is cold.
4. Remove air duct. Refer to EM-16, "Removal and Installation" .
5. Remove radiator upper hose and lower hoses. (A/T models)
6. Remove radiator shrouds. (A/T models)
7. Remove cooling fan. Refer to CO-22, "Removal and Installation (Crankshaft Driven Type) (A/T Models)" (A/T models).
8. Radiator cooling fan assembly. Refer to CO-24, "Removal and Installation (Motor Driven) (M/T Models)" (M/T models).
9. Remove water drain plug on water pump side of cylinder block.
10. Remove chain tensioner cover and water pump cover.
    - Use seal cutter [special service tool: KV10111100 (J37228)] or equivalent tool to cut liquid gasket for remove.
11. Remove the chain tensioner assembly with the following procedure.

a. Pull the lever down and release the plunger stopper tab.
   - Plunger stopper tab can be pushed up to release (coaxial structure with lever).

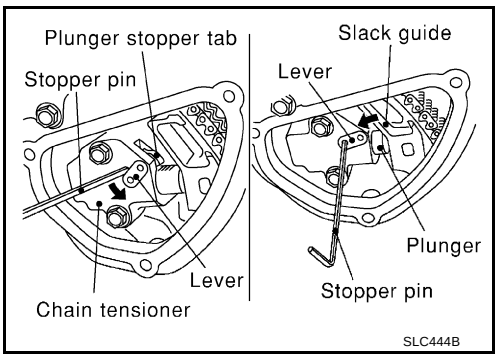


b. Insert the stopper pin into the tensioner body hole to hold the lever and keep the stopper tab released.

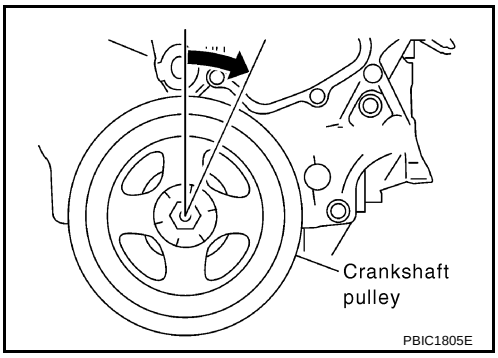
NOTE:
An allen wrench [2.5 mm (0.098 in)] is used for a stopper pin as an example.

c. Insert the plunger into the tensioner body by pressing the timing chain slack guide.

d. Keep the slack guide pressed and hold the plunger in by pushing the stopper pin deeper through the lever and into the tensioner body hole.

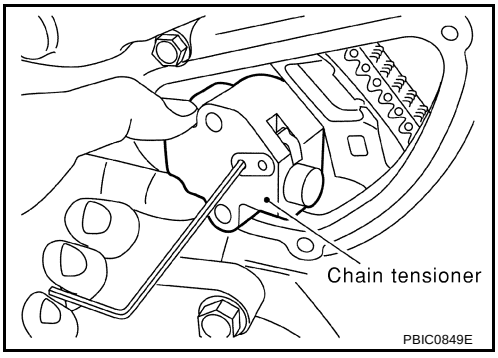


e. Turn crankshaft pulley clockwise so that the timing chain on the chain tensioner side is loose.

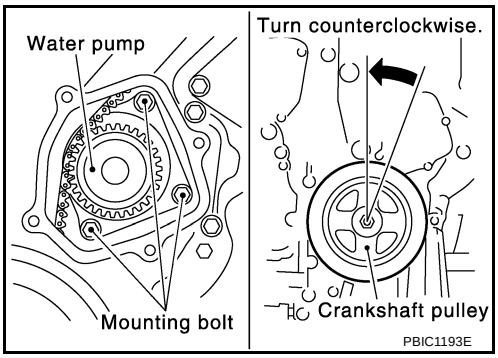


12. Remove chain tensioner.

CAUTION:
Be careful not to drop mounting bolts inside chain case.

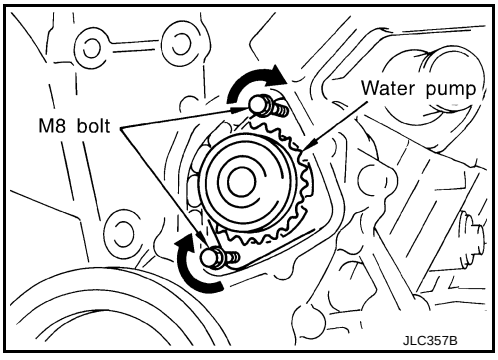


13. Remove the three water pump fixing bolts. Secure a gap between water pump gear and timing chain, by turning crankshaft pulley counterclockwise until timing chain looseness on water pump sprocket becomes maximum.



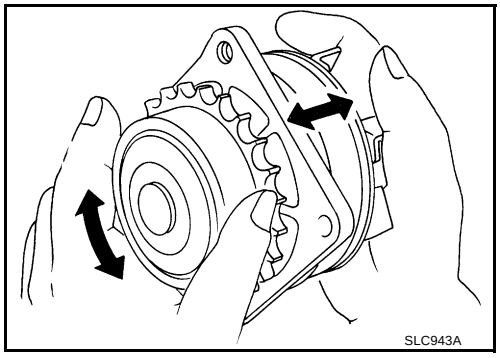
14. Screw M8 bolts [pitch: 1.25 mm (0.049 in) length: approx. 50 mm (1.97 in)] into water pumps upper and lower mounting-bolt holes until they reach timing chain case. Then, alternately tighten each bolt for a half turn, and pull out water pump.
    - Pull straight out while preventing vane from contacting socket in installation area.
    - Remove water pump without causing sprocket to contact timing chain.
15. Remove M8 bolts and O-rings from water pump.

CAUTION:
Do not disassemble water pump.



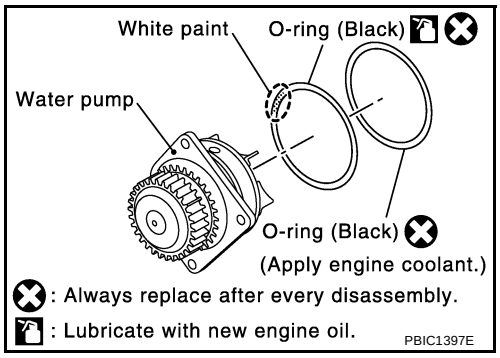
INSPECTION AFTER REMOVAL

- Check for badly rusted or corroded water pump body assembly.
- Check for rough operation due to excessive end play.
- Replace water pump, if necessary.

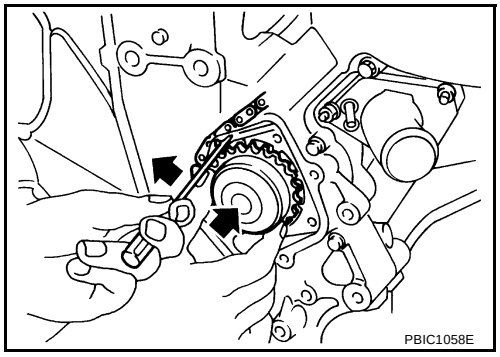


INSTALLATION

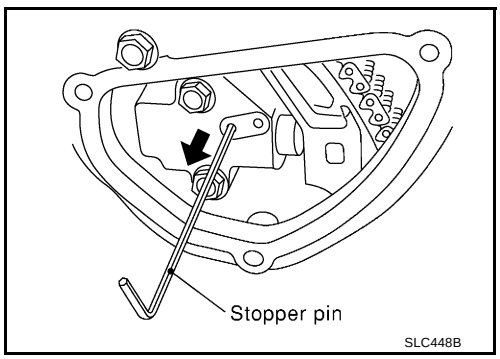
1. Install new O-rings to water pump.
   - Apply engine oil and engine coolant to the O-rings as shown.
   - Locate the O-ring with white paint mark to engine front side.



2. Install the water pump.
   - **Do not allow cylinder block to nip the O-rings when installing the water pump.**
   - Check that timing chain and water pump sprocket are engaged.
   - Insert water pump by tightening mounting bolts alternately and evenly.

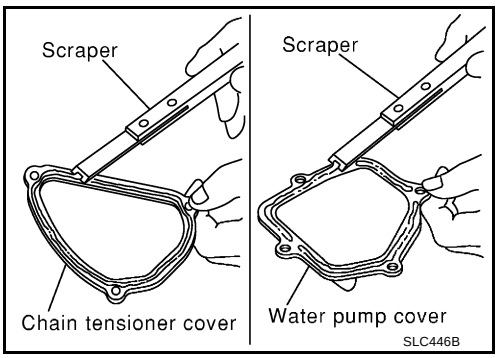


3. Remove dust and foreign material completely from backside of chain tensioner and from installation area of rear timing chain case.
4. Turn the crankshaft pulley clockwise so that the timing chain on the timing chain tensioner side is loose.
   - **When installing the timing chain tensioner, engine oil should be applied to the oil hole and tensioner.**
5. Install the timing chain tensioner.
6. Remove the stopper pin.

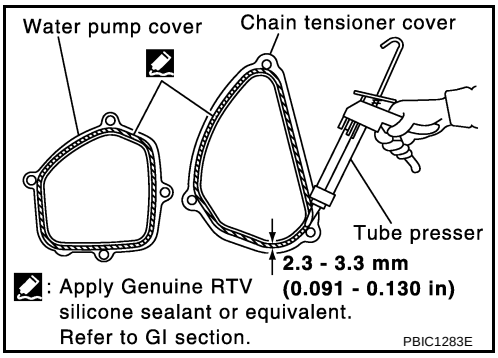


7. Install chain tensioner cover and water pump cover.

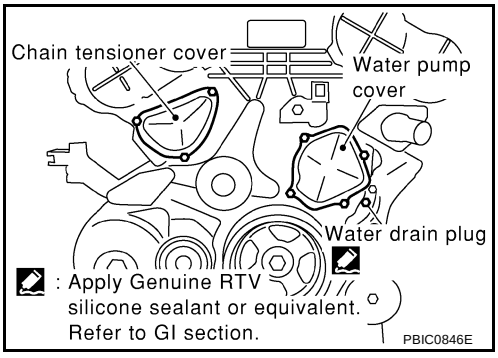
a. Before installing, remove all traces of liquid gasket from mating surface of water pump cover and chain tensioner cover using a scraper. Also remove traces of liquid gasket from the mating surface of the front cover.



b. Apply a continuous bead of liquid gasket using tube presser [special service tool: WS39930000 (—)] to mating surface of chain tensioner cover and water pump cover.
Use Genuine RTV Silicon Sealant or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS".



8. Install water drain plug on water pump side of cylinder block.



9. Installation is in the reverse order of removal for remaining parts.
   - **After starting engine, let idle for three minutes, then rev engine up to 3,000 rpm under no load to purge air from the high-pressure chamber of the chain tensioner. The engine may produce a rattling noise. This indicates that air still remains in the chamber and is not a matter of concern.**

INSPECTION AFTER INSTALLATION

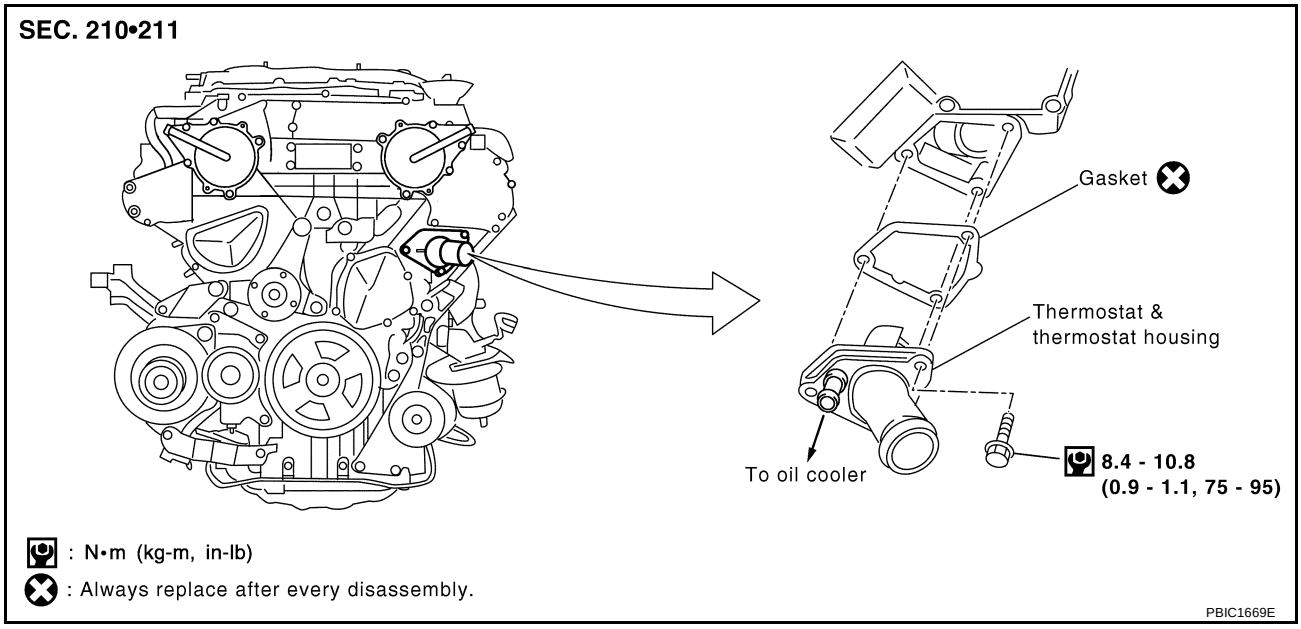
- Check for leaks of engine coolant using radiator cap tester adapter [special service tool: EG17650301 (J33984-A)] and radiator cap tester (commercial service tool). Refer to CO-11, "LEAK CHECK" .
- Start and warm up engine. Visually make sure that there is no leaks of engine coolant and A/T fluid (A/T models).

THERMOSTAT AND THERMOSTAT HOUSING

PFP:21200

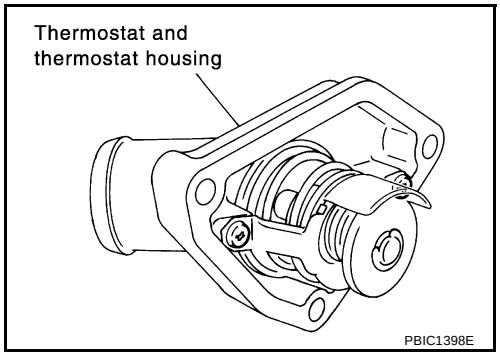
Removal and Installation

ABS0001P



REMOVAL

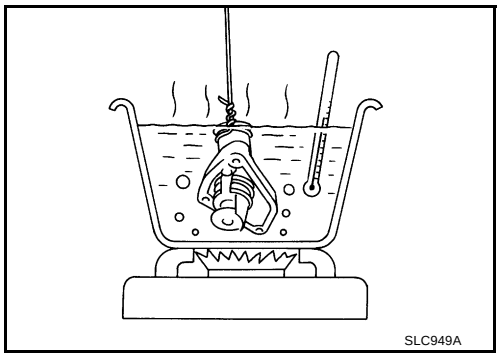
1. Remove undercover using power tools.
2. Drain engine coolant from the radiator. Refer to CO-11, "Changing Engine Coolant" .
3. Remove air duct. Refer to EM-16, "Removal and Installation" .
4. Remove water drain plug on water pump side of the engine. Refer to CO-26, "WATER PUMP" .
5. Remove radiator lower hose from thermostat and thermostat housing.
6. Remove oil cooler water hose from thermostat and thermostat housing.
7. Remove thermostat and thermostat housing.
   - **Do not disassemble thermostat and thermostat housing. Replace them as a unit, if necessary.**



INSPECTION AFTER REMOVAL

1. Check valve seating condition at ordinary room temperatures. It should seat tightly.
2. Check valve opening temperature and maximum valve lift.

Thermostat		Standard
Valve opening temperature	A/T	82°C (180°F)
	M/T	76.5°C (170°F)
Valve lift	A/T	8.6 mm / 95°C (0.339 in / 203°F)
	M/T	8.6 mm / 90°C (0.339 in / 194°F)



3. Then check if valve closes at 5°C (9°F) below valve opening temperature.

INSTALLATION

Install in the reverse order of removal.

INSPECTION AFTER INSTALLATION

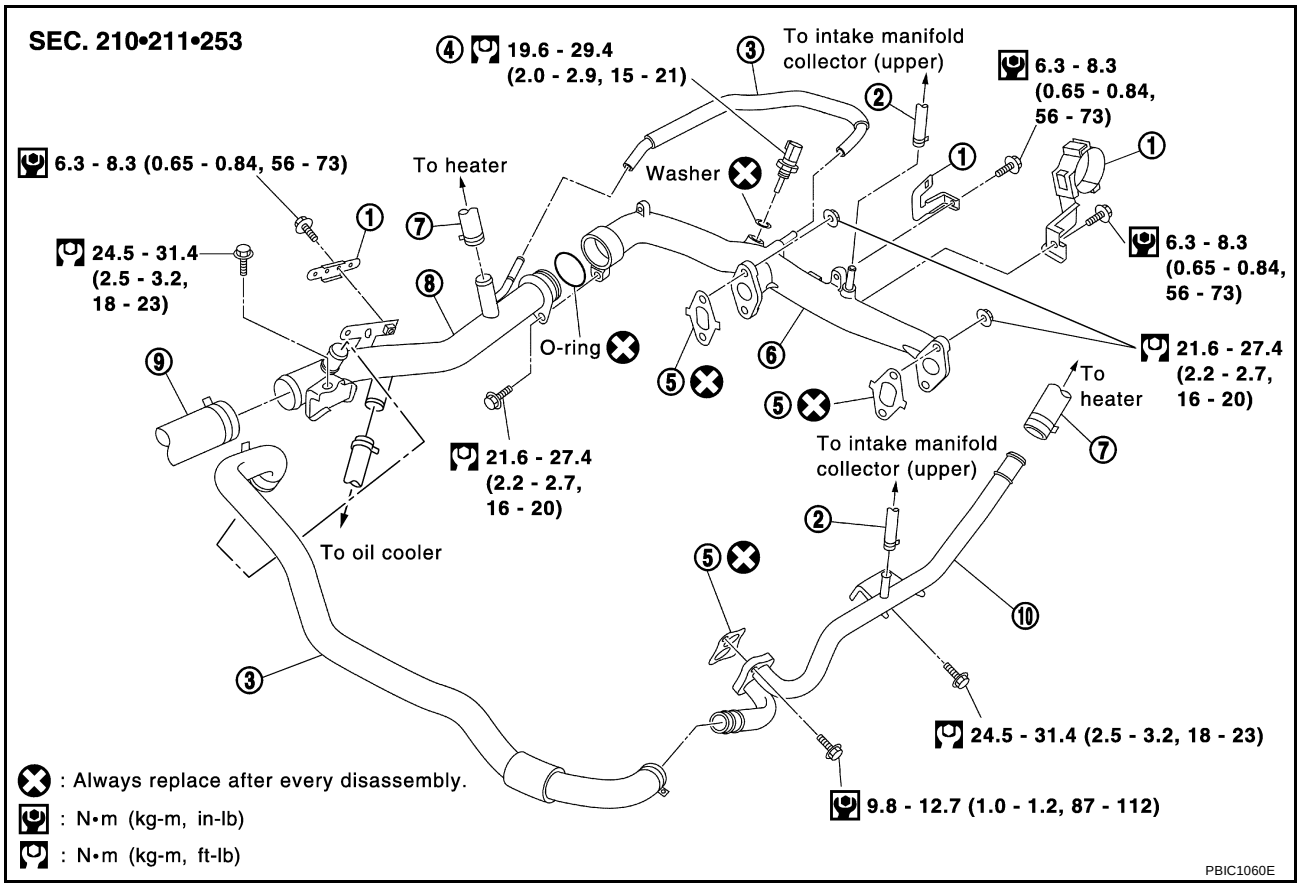
- Check for leaks of engine coolant using radiator cap tester adapter [special service tool: EG17650301 (J33984-A)] and radiator cap tester (commercial service tool). Refer to CO-11, "LEAK CHECK" .
- Start and warm up engine. Visually make sure that there is no leaks of engine coolant and A/T fluid (A/T models).

WATER OUTLET AND WATER PIPING

PFP:11060

Removal and Installation

ABS000JT



1. Harness bracket
2. Water hose
3. Water bypass hose
4. Engine coolant temperature sensor
5. Gasket
6. Water outlet
7. Heater hose
8. Water pipe
9. Radiator upper hose
10. Heater pipe

REMOVAL

1. Remove undercover using power tools.
2. Drain engine coolant from drain plugs on radiator and both sides of cylinder block. Refer to CO-11, "Changing Engine Coolant" .
3. Remove engine cover. Refer to EM-18, "REMOVAL" .
4. Remove air duct and air cleaner case. Refer to EM-16, "Removal and Installation" .
5. Remove radiator upper hose and heater hose.
6. Remove the following parts, when remove water outlet.
   - A/T fluid charging pipe (A/T models); Refer to AT-329, "TRANSMISSION ASSEMBLY" .
   - Intake manifold collectors (upper and lower). Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .
   - Rocker cover (right bank). Refer to EM-43, "ROCKER COVER" .
7. Remove engine coolant temperature sensor as necessary.

   CAUTION:

   Be careful not to damage engine coolant temperature sensor.
8. Remove water outlet, heater pipe, water bypass hoses and water pipe.

INSTALLATION

Install in the reverse order of removal.

- Securely insert each hose, and install a clamp at a position where it does not interfere with the pipe bulge.
- When inserting a water pipe into water outlet, apply neutral detergent to O-ring.

INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using radiator cap tester adapter [special service tool: EG17650301 (J33984-A)] and radiator cap tester (commercial service tool). Refer to CO-11, "LEAK CHECK" .
- Start and warm up engine. Visually make sure that there is no leaks of engine coolant.

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00100

Engine Coolant Capacity (Approximate)

ABS0001Q

Engine coolant capacity (With reservoir tank at MAX level)	A/T	8.5 ℓ (9 US qt, 7- 1/2 lmp qt)
	M/T	8.7 ℓ (9-1/4 US qt, 7-5/8 lmp qt)
Reservoir tank engine coolant capacity (at MAX level)		0.8 ℓ (7/8 US qt, 3/4 lmp qt)

Thermostat

ABS0001R

Valve opening temperature	A/T	82°C (180°F)
	M/T	76.5°C (170°F)
Valve lift	A/T	8.6 mm / 95°C (0.339 in / 203°F)
	M/T	8.6 mm / 90°C (0.339 in / 194°F)

Radiator

ABS0001S

Unit: kPa (kg/cm^2 , psi)

Cap relief pressure	Standard	78 - 98 (0.8 - 1.0, 11- 14)
	Limit	59 (0.6, 9)
Leakage test pressure		157 (1.6, 23)

Tightening Torque

ABS000JS

Unit: N·m (kg-m, ft-lb)
N·m (kg-m, in-lb)*

Air relief plug	0.78 - 1.6 (0.08 - 0.16, 7 - 14)*
Radiator drain plug	0.78 - 1.6 (0.08 - 0.16, 7 - 14)*
Fan shroud (A/T models)	3.8 - 4.5 (0.39 - 0.45, 34 - 39)*
A/C condenser	5.7 - 6.5 (0.59 - 0.66, 51 - 57)*
Reservoir tank	3.8 - 4.5 (0.39 - 0.45, 34 - 39)*
Radiator cooling fan assembly (M/T models)	3.8 - 4.5 (0.39 - 0.45, 34 - 39)*
Cooling fan (crankshaft driven) (A/T models)	5.9 - 9.8 (0.6 - 1.0, 53 - 86)*
Fan coupling (A/T models)	5.9 - 9.8 (0.6 - 1.0, 53 - 86)*
Cooling fan (motor driven)	2.9 - 3.9 (0.30 - 0.39, 26 - 34)*
Fan grille (A/T models)	5.7 - 6.5 (0.58 - 0.66, 51 - 57)*
Fan motor	3.9 - 4.9 (0.40 - 0.49, 35 - 43)*
Water drain plug (front)	7.8 - 11.8 (0.8 - 1.2, 69 - 104)*
Water pump	8.4 - 10.8 (0.9 - 1.1, 75 - 95)*
Water pump cover	9.8 - 12.8 (1.0 - 1.3, 87 - 113)
Chain tensioner cover	9.8 - 12.8 (1.0 - 1.3, 87- 113)
Chain tensioner	6.9 - 9.3 (0.70 - 0.94, 61 - 82)*
Water outlet	21.6 - 27.4 (2.2 - 2.7, 16 - 20)
Thermostat and thermostat housing	8.4 - 10.8 (0.9 - 1.1, 75 - 95)*
Engine coolant temperature sensor	19.6 - 29.4 (2.0 - 2.9, 15 - 21)